Polarimetry and Planned Experiments at the Superconducting Darmstadt Electron Linac S-DALINAC*

W. F. O. Müller, B. Steiner, T. Weiland, Institut für Theorie Elektromagnetischer Felder, TU Darmstadt, Germany

**Mott Polarimeter at 100 keV and 5-10 MeV**

- Asymmetry: $A(0) = (13.8 \pm 0.4)\%$
- Spin polarization:
  - Bulk: $P = (35.5 \pm 1.4)\%$
  - Superlattice: $P = (86 \pm 3)\%$

5-10 MeV Mott polarimeter design:
- Sherman function: min at 173° or more
- Difficult geometric shape
- Selected detector angle: 165°

**Möller Polarimeter at 30-130 MeV**

Polarization dependent cross section

Möller scattering angle

**Photofission**

- Polarized bremsstrahlung for fission of $^{238}U$
  - Parity violation experiments
  - Neutron induced fission
    - Thermal neutrons
    - Neutron scattering
    - Low-lying resonances
  - Effects in the order of $10^{-6}$
  - Alternate probe: photons

- Active target setup
  - Solid target sensitivity: 10°
  - Yield estimate: 0.1/(μA s)
  - Improvement: gas target device
  - Gas mixture of $^{19}F$ and Argon?

**S-DALINAC Design**

- Energy: 130 MeV
- Beam Current: 60 μA
- Duty Cycle: 3 GHz cw

**Mott Polarimeter at 100 keV**

100 keV Sherman function

**Möller Polarimeter at 5-10 MeV**

Polarization dependent cross section

S-DALINAC Design

Energy: 130 MeV
Beam Current: 60 μA
Duty Cycle: 3 GHz cw

**(e,e'x) Experiments**

Polarized structure functions in electron scattering

Inclusive scattering

Exclusive scattering

Polarized scattering

P or T violation

Final state interaction

Polarized targets

Polarization transfer

Measurement of fifth structure function at low momentum transfer

Break-up reaction of $^3$He for investigation of three-body force

*Work supported by DFG through SFB 634
†Corresponding author: eckardt@ikp.tu-darmstadt.de